REMARKS/ARGUMENTS

Prior to entry of the amendments specified above, claims 33-64 were pending in the application under a non-final rejection. Claims 33, 34, 35, 42, 47, 48, 49, 54, 55, 56 and 63 have now been amended, as discussed immediately below, for reasons of a cosmetic nature and to attend to certain issues of form identified by the Examiner.

I. Amendments to the Claims

Claim 33 has been amended primarily to ensure antecedent basis for certain terms raised in dependent claims and to more distinctly point out that programming language commands are provided in the graphical editor as a function of the configuration of the controlled machine. Support is found, among other places, in claim 1 as originally filed, at paras. 0009-0010.

Claim 34 has been amended to delete the word "structured," eliminating any antecedent basis issue in that claim.

Claim 35 has been amended to modify its dependency from claim 33 to claim 34.

Claim 42 has been amended so as to depend from claim 41.

Claim 47 has been amended to correct a typographical error involving the word "adapted" and for purposes of readability.

Claim 48 has been amended to correct a typographical error. The term "re transaction" has been replaced by the term "re-translation".

Claim 49 has been amended to address issues of a cosmetic nature and to rewrite "flowchart editor" as "graphical editor".

Claim 54 has been amended to modify its dependency from claim 50 to claim 51, thereby ensuring antecedent basis for the phrase "language elements."

Claim 55 has been amended to delete a superfluous recitation of the word "for".

Claim 56 has been amended for the purely cosmetic reason of deleting an extra period symbol inserted during the preliminary amendment.

Claim 63 has been amended to address its readability, thereby also alleviating a typographical error involving the phrase "a reduced form."

No new matter been added by these amendments.

II. Double Patenting Rejection of Claim 19

Claim 33 stands rejected on the judicially-created doctrine of double patenting over co-pending, commonly assigned U.S. Patent Application Serial No. 09/911,585.

Applicants submit herewith a Terminal Disclaimer under 37 C.F.R. §§1.321(c), 1.130(b) and respectfully request that this basis for rejection accordingly be withdrawn.

III. Rejections Under 35 U.S.C. § 112, ¶2

Claims 34, 35, 38, 40, 43, 49 and 54 stand rejected under 35 U.S.C. § 112, ¶2.

Claim 34 has been amended to delete the word "structured" and, with it, any basis for rejection.

Claim 35 depends from claim 33, which has been amended to provide an antecedent bases for "graphical elements" and "motion control flowchart." The amendment now overcomes this basis for rejection, which also addresses the rejection of claims 38, 40, 43.

Claim 49 has been amended to modify "flowchart editor" to "graphics editor."

Claim 54 has been amended to depend from claim 51, rather than claim 50, ensuring an antecedent basis for the "language elements".

IV. Rejections Under 35 U.S.C. § 103(a)

A. General

The present invention relates in part to the programming of motion controllers used in manufacturing processes. The invention enables programming language commands to be made available that are a function of the configuration of the machine being controlled. Among other advantages, this permits an original equipment manufacturer of an industrial machine to transfer already existing code (e.g., subprograms) to a flowchart or other graphical editor, where they can automatically be made available to the programmer. See, e.g., App. paras. 0012, 0013.

As discussed below, the references relied upon to support the pending rejections are not properly combinable and, even if combined, would neither disclose nor suggest the invention as recited in the presently pending claims.

A. Claims 33-35, 45-47, 49-51 and 61-63

Claims 33-35, 45-47, 49-51 and 61-63 stand rejected under 35 U.S.C. § 103(a) as unpatentable over U.S. Patent No. 6,442,442 to Weinhofer (Weinhofer) in view of U.S. Patent No. 6,282,699 to Zhang (Zhang).

i. Claims 33-35

An obviousness rejection requires the establishment of a prima facie case that claimed subject matter would have been obvious to a person having ordinary skill in the art, where the establishment of a prima facie case requires that all of the claim elements are found either in a single prior art reference or in a plurality of prior art references that can be properly combined. As no such prima facie case has been established, Applicants respectfully traverse these prior art rejections.

The primary reference relied upon in rejecting the pending claims, Weinhofer, is acknowledged not to disclose the following limitations, which are present in all of the pending claims:

> "generating a textual language based on the flowchart, converting textual language into a processor-independent pseudo-code, loading the processor-independent pseudo-code into the controller, and converting the processor-independent pseudo-code into an executable code" for execution.

These limitations are said to be supplied by Zhang. Applicants respectfully submit, however, that Zhang does not address, disclose or suggest these or any other aspects of the invention as claimed.

Zhang does not disclose or suggest generating a textual language based on the flowchart either conversion, or, as presently claimed, generation, of graphical elements based on structured text subprograms as required by the pending claims. Nor does Zhang disclose or suggest graphical elements having function interfaces corresponding to the respective structured text subprogram, also as required.

Moreover, Zhang does not disclose that the plurality of commands (that are the subsequent object of generation of textual language, conversion into processor-independent pseudo code, etc.) comprise commands provided as a function of the configuration of the controlled machine. Zhang thus neither recognizes, provides for nor enables the advantages that follow from the claimed method, including: making programming language commands to be made available that are a function of the configuration of the machine being controlled, or more particularly, permitting an original equipment manufacturer of an industrial machine to transfer already existing code (e.g., subprograms) to a flowchart or other graphical editor, where they can automatically be made available to the programmer.

Zhang does not disclose or suggest processor-independent pseudo-code. Neither the words "pseudo" nor "independent," nor any analogous concept, appear anywhere in Zhang.

The rejection relies on column 3, lines 6-7 and 47-50 as sources of support for the proposition that Zhang discloses what Weinhofer admittedly lacks. The first of these passages refers to "a data flow program, referred to as a block diagram, representing the graphical data flow which accomplishes his desired function." This, though, is not pseudo-code, nor processor-independent pseudo-code. Nor does it have to do with generating such processor-independent pseudo-code from textual language.

Lines 47-50 refer to a "code interface node (CIN)...[which] is a block diagram node associated with a section of source code written in a *conventional* programming language, i.e., text code. The user compiled the source code first and linked it to a form executable code."

This cited passage refers to conventional – processor-dependent – code, not pseudo-code and certainly not processor-independent pseudo code.

The inapplicability is illustrated by an example. Using the claimed method, an original equipment manufacturer's preexisting subprograms that are a function of the configuration of the controlled machine (which is hardware supplied by that original equipment manufacturer, an expert on its structure and behavior) can be transferred to a flowchart or other graphical editor, where they can automatically be made available to the programmer. See, e.g., App. paras. 0012, 0013. Zhang does not contemplate any such functionality, nor the claimed method, which is capable of providing this and other such advantages.

For these reasons, claim 33, as well as all other pending rejected claims dependent on claim 33, are patentable over the cited art. Reconsideration and allowance is therefore requested.

Claims 34 and 35

Claim 34 depends from claim 33 and, as amended, further recites the limitation that "graphical elements comprising function interfaces of corresponding subprograms are generated in flowchart notation from user-defined subprograms of the textual language."

The cited references, whether alone or taken in combination, do not disclose or suggest the generation of text subprograms or graphical elements having function interfaces corresponding to the respective text subprogram.

For this additional reason, claim 34 and claim 35, which now depends from it, are submitted to recite patentable subject matter.

ii. Claims 45-47

Claim 45

Claim 45 depends from claim 33 and is allowable for the same reasons.

In addition, it recites that the graphic elements of the flowchart are positioned automatically.

The rejection of claim 45 is based on the contention that Weinhofer teaches this additional limitation. Supposedly, Weinhofer "provides the user with a workspace 107 and makes available a plurality of icons that can be dragged into the workspace 107."

This passage suggests, if anything, that icons are provided and that they are repositioned manually, by dragging. It does not, however, provide any disclosure or teaching, much less an enabling disclosure, that graphic elements that have been generated (on the basis of the structured text) are automatically positioned, such as in the editor. As described in the text of the application summarizing the claimed invention, "When a user wants to represent a new icon in the flowchart editor, it is automatically positioned at the point that is the next, in order to correspond to the logical program sequence." This increases the user's efficiency since, since one does not have to position the icons that one has generated. Weinhofer's manual re-positioning neither discloses nor suggest the invention as claimed. Therefore, it is submitted to be patentable over the art of record.

Claim 46

Claim 46 depends from claim 33 and is submitted to be patentable for the same reasons.

In addition, claim 46 recites that "graphical elements of the flowchart are automatically linked together." This is said to be disclosed or suggested by Weinhofer and Zhang.

However, the passage from Weinhofer relied on in support of the rejection, merely states that icons are "made available to the user..." and that they "are connected by a plurality of connection lines." This passage neither discloses nor suggests that the graphical elements are linked together *automatically*, as recited.

For this additional reason, claim 46 recites patentable subject matter and should be allowed.

Claim 47

Claim 47 depends from claim 33 and is allowable for the same reasons. In addition, it recites, in presently amended form, that "the flowchart is adapted to be displayed in a form that can be enlarged or reduced."

This claim is rejected over the combination of Weinhofer and Zhang. The passage cited from Weinhofer at column 8, lines 7-8, by contrast indicates only that there is a single display – on which "the entire workspace 107 is viewable." There is no disclosure or suggestion of any ability to reduce or enlarge it.

For this additional reason, claim 47 is submitted to be allowable over the art of record.

iii. Claims 49-51

Claim 49

Claim 49 recites a device that might be suitable for carrying out a method of the type recited in claim 33 and has been rejected on similar grounds.

Claim 49 is submitted to be allowable over the art of record for reasons analogous to those set forth above in connection with that claim, here incorporated by reference.

Claim 50

Claim 50 is directed to a device of a sort for performance of a method as recited in claim 34 and has been rejected on the same basis.

In addition to being patentable as dependent from claim 49, claim 50 is allowable for the reasons set forth above in connection with claim 34.

iv. Claims 61-63

Claims 61-63 depend from claim 49 and are submitted to be patentable for the same reasons. In addition, claims 61-63 are directed to devices analogous to those of claims 45-47. For reasons similar to those set forth above in connection with these claims 45-47 and 49, claims 61-63 are submitted to be allowable.

B. Claims 36-37 and 52-53

Claims 36-37 and 52-53 stand rejected over Weinhofer and Zhang, further in view of U.S. Patent No. 6,263,487 to Stripf et al. ("Stripf").

i. Claims 36-37

Claim 36

Claim 36 depends from claim 33 and is submitted to be allowable for the same reasons.

Claim 37

Claim 37 depends indirectly from claim 33 and is patentable for the same reasons. In addition, it depends from claim 36, which recites that textual language comprises structured text according to IEC 6-1131, and adds that "a user can switch between structured textual language, contact plan and function plan as forms of representation for formulating conditions."

Weinhofer and Zhang are acknowledged not to disclose the invention as claimed. The limitation is said to be provided by Stripf, particularly the passage at column 2, lines 47-50 of that reference.

While the selected passage from Stripf states that "a user creates a control program in the form of a contact plan..., a function plan, an instruction list or in any other suitable form...," it does not suggest "*switching* between three forms," as claimed.

Thus, even if the combination of references were proper, which it is not, the combination would neither disclose nor suggest the invention as claimed. The combination would require impermissible hindsight reliance on the subject application to identify and to attempt to pick and choose from select references (which at any rate lack the necessary disclosure) to arrive at the claimed invention.

For these reasons, claim 37 is submitted to be allowable over the art of record.

ii. Claims 52-53

Claims 52 and 53 are device claims that depend from claim 49 and that parallel method claims 36-37. Claims 52 and 53 are allowable for the same reasons set for the above for claim 49. In addition, the are submitted to be allowable for reasons analogous to those provided in connection with claims 36-37.

C. Claims 38, 44, 54 and 60

Claim 38

Claim 38 depends from claim 33 and is submitted to be allowable for the same reasons. In addition, claim 38 recites that "the motion control flowchart notation comprises at least one of the group consisting of loop and parallel branch language elements."

Weinhofer and Zhang are acknowledged not to disclosure or suggest the invention as claimed, but the further combination with U.S. Patent No. 6,144,984 to DeBenedictis is cited against the claim.

First, the combination of references to reject claim 38 is improper. DeBenedictis is not a reference that relates to motion controllers, as recited in the present claims, nor even to the general field of industrial automation. Without the benefit of the present application, one of ordinary skill in the field of industrial control would not have had a motivation to look for a reference like DeBenedictis. The supposed motivation is that "the system would be enhanced." (Office Action at 14). Applicants respectfully submit that this vague notion of "enhancement" is neither a specific nor concrete enough motivation to look outside the field of industrial automation or to look specifically for the particular "loop or parallel branch" structure allegedly found in the DeBenedictis reference.

At any rate, the combination would not disclose or suggest the invention as recited in claim 38. DeBenedictis at reference numeral 902, relied on as showing a parallel branch, shows merely a conditional language element.

But a "parallel branch" command, as made clear in the subject application at page 11, para. 0034 and Figure 6 (see "sync"), is distinct from a conditional command: "this symbol, like WHILE [i.e., loop] and IF [i.e., conditional] statements is also represented by a hexagonal honeycomb-shaped graphical element." Id.

In summary, none of the applied references, whether alone or in combination, would disclose the invention as claimed. Claim 38 which depends from it (and is , are therefore submitted to be patentable over the art of record.

Claim 44

Claim 44, like claim 38, stands rejected over Weinhofer and Zhang, further combined with DeBenedictus. As discussed above, this combination is improper.

Claim 44 depends from claim 33 and is submitted to be allowable for the same reasons.

In addition, claim 44 recites that "function blocks representing functions requiring a given period of time comprise step-enabling conditions in motion control flowchart notation."

In addition to being improper, the combination of Weinhofer, Zhang and DeBenedictis neither discloses nor suggests the claimed invention. DeBenedictis at conditional 504 of Figure 5 is cited as "determining if the task is ready for execution" and changing an argument (t) to a "tie value."

The subject application, however, makes clear that step-enabling conditions are specified by a user, such as at a "waiting condition," to "synchronize [machine tool] functions (e.g., reference point approach or axial positioning) or their interaction." App. at para. 0040, pp. 12-13.

Thus, the recited "step-enabling conditions" are neither disclosed nor suggested by the art of record.

Claim 44, therefore, is submitted to be allowable.

Claim 54

Claim 54 is a device claim analogous to claim 38 and has been rejected on the same grounds. For the reasons given above in connection with claim 38, and because it depends from allowable claim 49, claim 54 is submitted to be allowable.

Claim 60

Claim 54 is a device claim analogous to claim 44 and stands rejected on the same grounds. Claim 60 is submitted, however, to be allowable as dependent on claim 49 and for the same reasons set forth above in connection with claim 44.

D. Claims 40 and 56

Claims 40 and 56 stand rejected under 35 U.S.C. §103 over Weinhofer and Zhang, further in view of U.S. Patent No. 6,289,252 to Wilson ("Wilson").

Claim 40

Claim 40 depends from claim 33 and is allowable for the same reasons. In addition, claim 40 recites that "parameters for the function blocks are set via a mask input."

It is acknowledged in the rejection that Weinhofer and Zhang, even if properly combinable, which they are not, would fail to disclose or suggest this limitation. This deficiency is said to be overcome by Wilson.

Whether or not Weinhofer, Zhang and Wilson can be properly combined, which Applicants do not concede, the combination would not lead to the claimed invention. Wilson, at column 14, lines 46-47, states that "The commands are generally indicative of state changes performed by the batch server program state machine in accordance with operator input and other control input and parameters." Whether or not any parameters are set, neither this cited text nor any other text or figures of Wilson teach or suggest setting parameters for function blocks via mask input in motion control flowchart notation, as claimed. These limitations are entirely absent from the applied references.

For this additional reason, claim 40 is submitted to be allowable over the art of record.

Claim 56

Claim 56 is a device claim analogous to claim 40 and is submitted to be allowable for the same reasons, set for the above. In addition, dependent from claim 49, claim 56 is submitted to be allowable for the same reasons as that claim is as well.

E. Claims 41-42 and 57-58

Claim 41

Claim 41 depends from claim 33 and is submitted to be allowable for the same reasons.

Claim 42

Claim 42 depends, as now amended, from claim 41 and, indirectly from claim 33 and is submitted to be allowable on the same basis.

Additionally, claim 42 recites that "interleaved modules are provided in motion control flowchart notation." This limitation is acknowledged to be absent from Weinhofer and Zhang,

but is said to be shown by U.S. Patent No. 6,553,268 to Schwenke ("Schwenke"). That cited passage states: "For example, one type of module specification is a module "list" which allows zero or more component modules of a specific type (i.e., associated with a specific template)." Reference is also made to Figure 18, which is a flowchart that includes the word "module" at several points.

The claimed invention is not simply claiming the use of "modules." Rather, it specifies that modules, in turn formed of combined function blocks, are interleaved in motion control flowchart notation. Schwenke does not disclose or suggest such modules formed of combined function blocks. Nor does Schwenke show the interleaving of the modules in a flowchart. Figure 18 of Schwenke shows instructions that might refer to a module, but does not actually show a module (of the sort recited in the claim) in a flowchart. In short, the combination, whose propriety is not conceded, neither discloses nor suggests the claimed invention.

For this additional reason, claim 42 is submitted to be patentable over the art of record.

Claims 57 and 58

Claims 57 and 58 are analogous to claims 41 and 42 and are submitted to be patentable for the same reasons, set forth above. In addition, they are submitted to be patentable as dependent from claim 49.

F. Claims 43 and 59

Claims 43 and 59 stands rejected under 37 U.S.C. § 103(a) as unpatentable over Weinhofer in view of Zhang and further in view of U.S. Patent No. 6,466,827 to Stine ("Stine").

Claim 43 depends from claim 33 and is submitted to be patentable for the same reasons.

In addition, claim 43 recites the step of "assigning, in motion control flowchart notation, multiple variables in function blocks." This limitation is acknowledged not to be disclosed or suggested by Weinhofer and/or Zhang, but is said to be disclosed by Stine. The recited passage from Stine states that "each relay ladder object 66 maps to a different set of variables...."

Relay ladder logic, disclosed by Stine, is not flowchart notation. Nor would existence of a mapping between a relay ladder object and a set of variables, in Stine, disclose or suggest the step of assigning multiple variables in "function blocks."

In addition, no proper motivation has been presented for this three-way combination. The alleged motivation, as above, is that the system would be "enhanced by allowing control program executed on a standard computer, which control blocks/objects through its variables." To the extent this passage is understood, it does not show that there existed any motivation in the references or the art generally to combine the particular elements recited in the claim and could not have been arrived at without the benefit of the claimed invention. The combination is submitted to be improper and not showing has been made that Stine's relay ladder objects could be combined with the (already improper) combination of Weinhofer and Zhang.

Claim 59 is a device claim analogous to method claim 43 and is submitted to be patentable for similar reasons.

G Claims 48 and 64

Claims 48 and 64 stand rejected under 35 U.S.C.§103(a) over Weinhofer in view of Zhang, further in view of U.S. Patent No. 4,852,047 to Lavallee ("Lavallee").

Claim 48

Claim 48 depends from claim 33 and is patentable on the same basis. Claim 48, as now amended, recites that "the textual language comprises notation facilitating its retranslation to flowchart notation."

Whereas it is conceded that Weinhofer and/or Zhang do not disclose the invention including this recitation, this is supposedly shown by Lavallee. The text from Lavallee relied on, in pertinent part, in support of the rejection states as follows: "Thereafter, upon recompiling, the program illustrated in FIG. 2B is executed via the system of FIG. 1, with the simple editing having been accomplished through the addition of an additional set of blocks in the displayed flow chart."

Lavallee does not disclose or refer to textual language, nor retranslating such textual language into motion control flowchart notation, particularly as presently recited. For this additional reason, claim 34 is submitted to be allowable over the art of record.

Claim 64

Claim 64 is a device claim analogous to claim 48 and submitted to be patentable for the same reasons. In addition, claim 64 depends from allowable claim 49.

V. Objection to Claims 39 and 55

Claims 39 and 55 are objected to as being allowable if rewritten in independent form. Because Applicants disagree with the rejection of the base claims from which claims 39 and 55 depend, they elect not to rewrite the claims at this time but reserve the right to do so at a later date.

CONCLUSION

Upon entry of this Amendment, claims 33-64 are pending in the Application. Applicants submit that the claims, for the reasons set forth above, are now in condition for allowance. Reconsideration and allowance are therefore respectfully requested.

If a fee is required, the Assistant Commissioner is authorized to charge the fee to Deposit Account No. 23-1703.

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Respectfully submitted,

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